*3D Digital Documentation of Cultural Resources in Southern Arizona National Parks*

**Introduction**

The National Park Service Southern Arizona (SOAR) group consists of Casa Grande Ruins National Monument, Chiricahua National Monument, Coronado National Memorial, Fort Bowie National Historic Site, Tumacacori National Historical Park, and Tonto National Monument, Saguaro National Park, and Organ Pipe Cactus National Park. Individual park resource managers, in conjunction with a variety of cooperators , are using this technology to document, manage, and make informed preservation decisions for a diverse group of cultural resources ranging from extensive masonry architecture to ephemeral backcountry archeological sites. The SOAR group has embraced the philosophy that some cultural assets will inevitably be harmed and even lost in a future of increasing impacts and limited resources, and "preservation through documentation" constitutes the preferred alternative to total information loss. As technology, techniques and expertise progress, the SOAR group is exploring new ways to document cultural resources and manage, access, and exploit existing datasets.

**Current Applications and Initiatives**

SOAR has been using 3D laser scanning technology extensively to record topography and architecture associated with cultural resources. As a result of these efforts we have been successful in generating high a variety of products including: accurate planimetric maps, three-dimensional models, and vector architectural analysis sheets. High-resolution photography mosaics are draped onto wall segment models, resulting in a highly accurate structural record upon which to base future monitoring, condition assessment, and stabilization activities. Ground penetrating radar has been used to map subsurface architecture and structural integrity. Digital photogrammetry and RTK GPS survey techniques have been employed to create high resolution digital elevation models of entire parks, aiding in backcountry site cartography efforts and erosion detection.

**Data Management and Access:**

The SOAR group has partnered with the Western Archeological Conservation Center to develop a long-term digital archiving system to curate large scanning and survey datasets to preserve a "clone of reality" for the future. Data access is being extended by integrating 3D products and other documentation with GIS web mapping applications, as well as the use of tablet PC's to access spatial data during field monitoring and survey endeavors. The development of data standards and quality and interoperability assurance is also a priority in Southern Arizona parks in order to ensure that the most is made of investments in 3D documentation technology.

**Future Applications**

The SOAR group is looking into leveraging previously collected data with new data sets in order to answer recurring resource management questions. A preservation plan is scheduled for development for the Great House at Casa Grande Ruins National Monument incorporating 3D digital documentation, potentially including multi-temporal laser scans to quantify wall movement, material loss, and crack movement as well as multi-spectral imaging to analyze surface integrity. Border impacts monitoring and condition assessment efforts in Southeast Arizona are exploring ways to model and record soil loss and other physical impacts to cultural sites due to border activity.

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